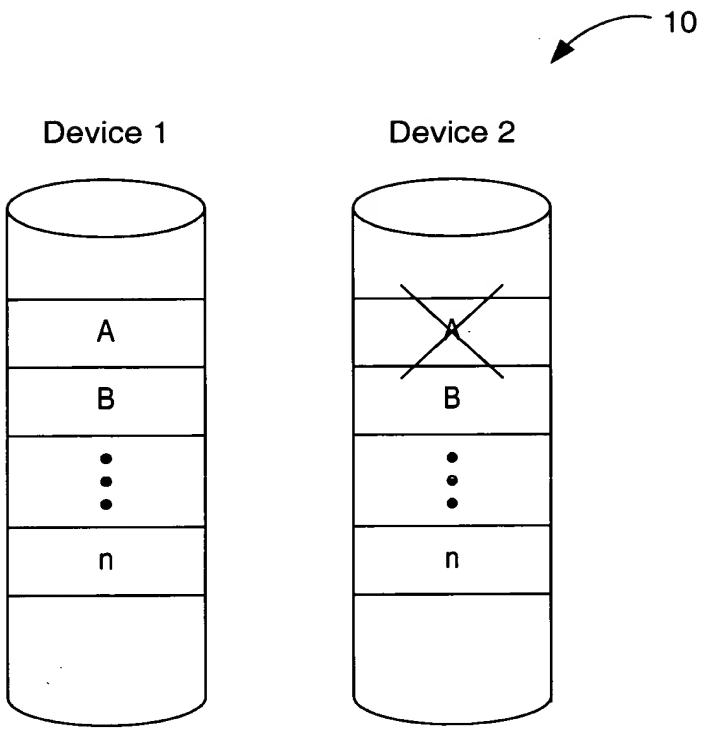


Fig. 1A

09809169 - 050102

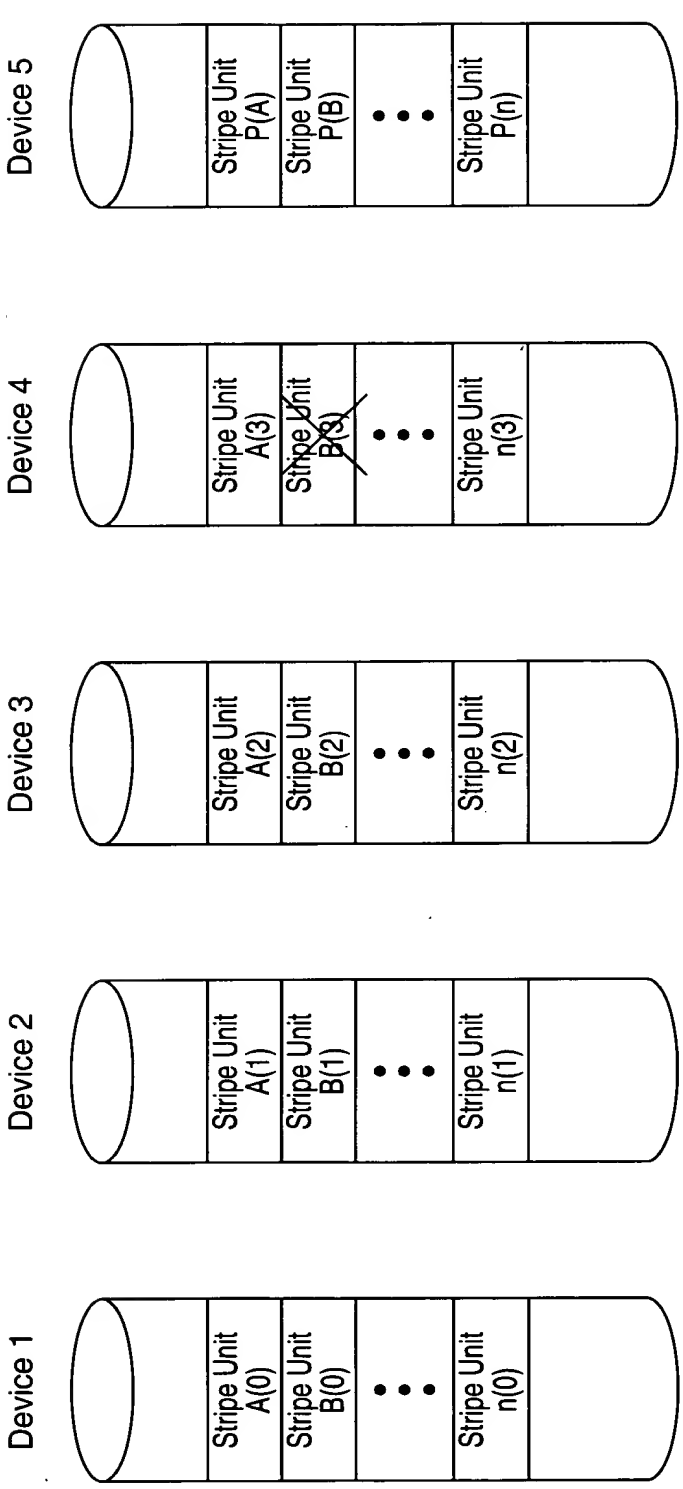

20
Device 1
Stripe Unit A(0)
Stripe Unit B(0)
Stripe Unit n(0)
Device 2
Stripe Unit A(1)
Stripe Unit B(1)
Stripe Unit n(1)
Device 3
Stripe Unit A(2)
Stripe Unit B(2)
Stripe Unit n(2)
Device 4
Stripe Unit A(3)
Stripe Unit B(3)
Stripe Unit n(3)
Device 5
Stripe Unit P(A)
Stripe Unit P(B)
Stripe Unit P(n)

Fig. 1B

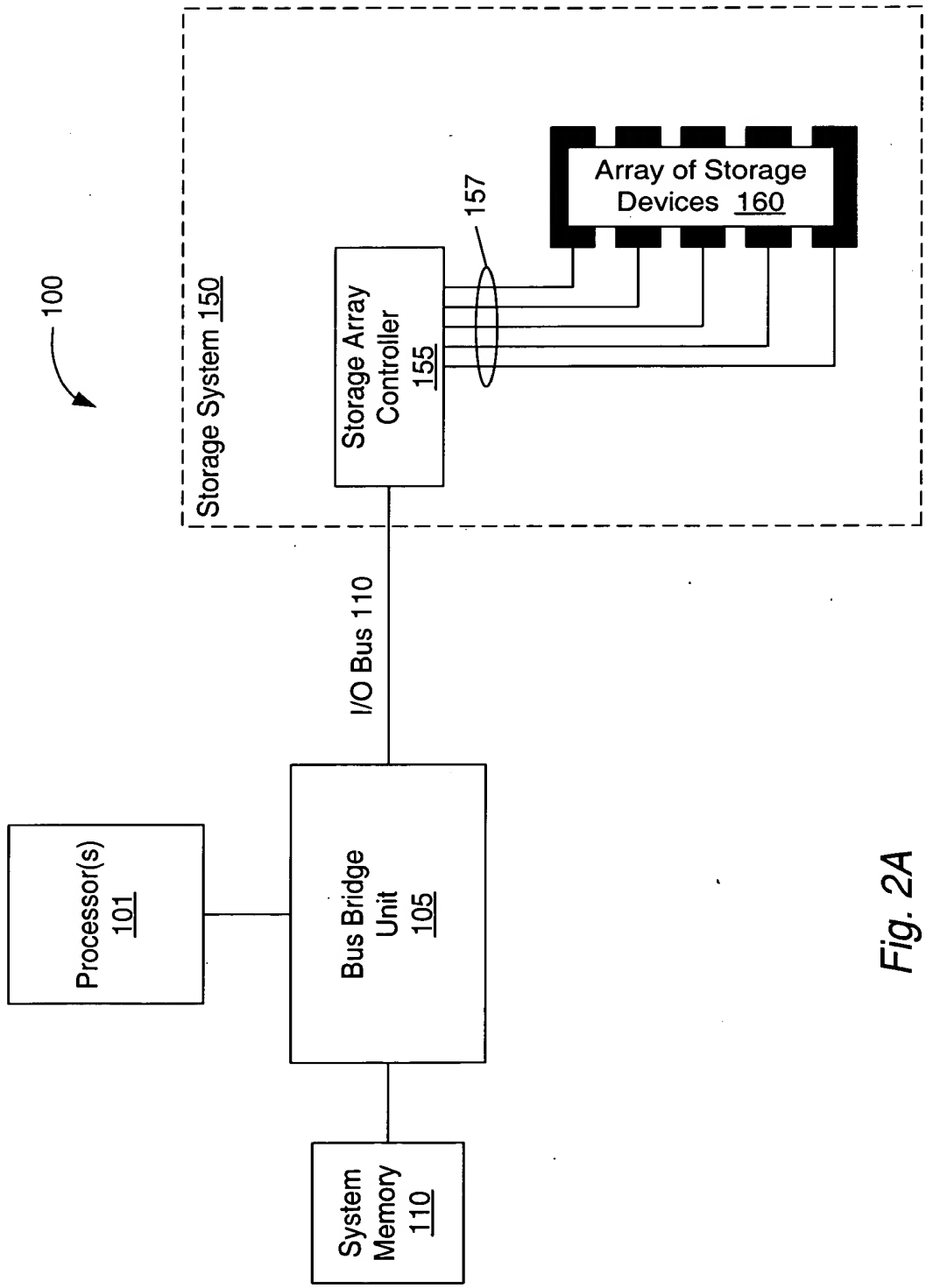
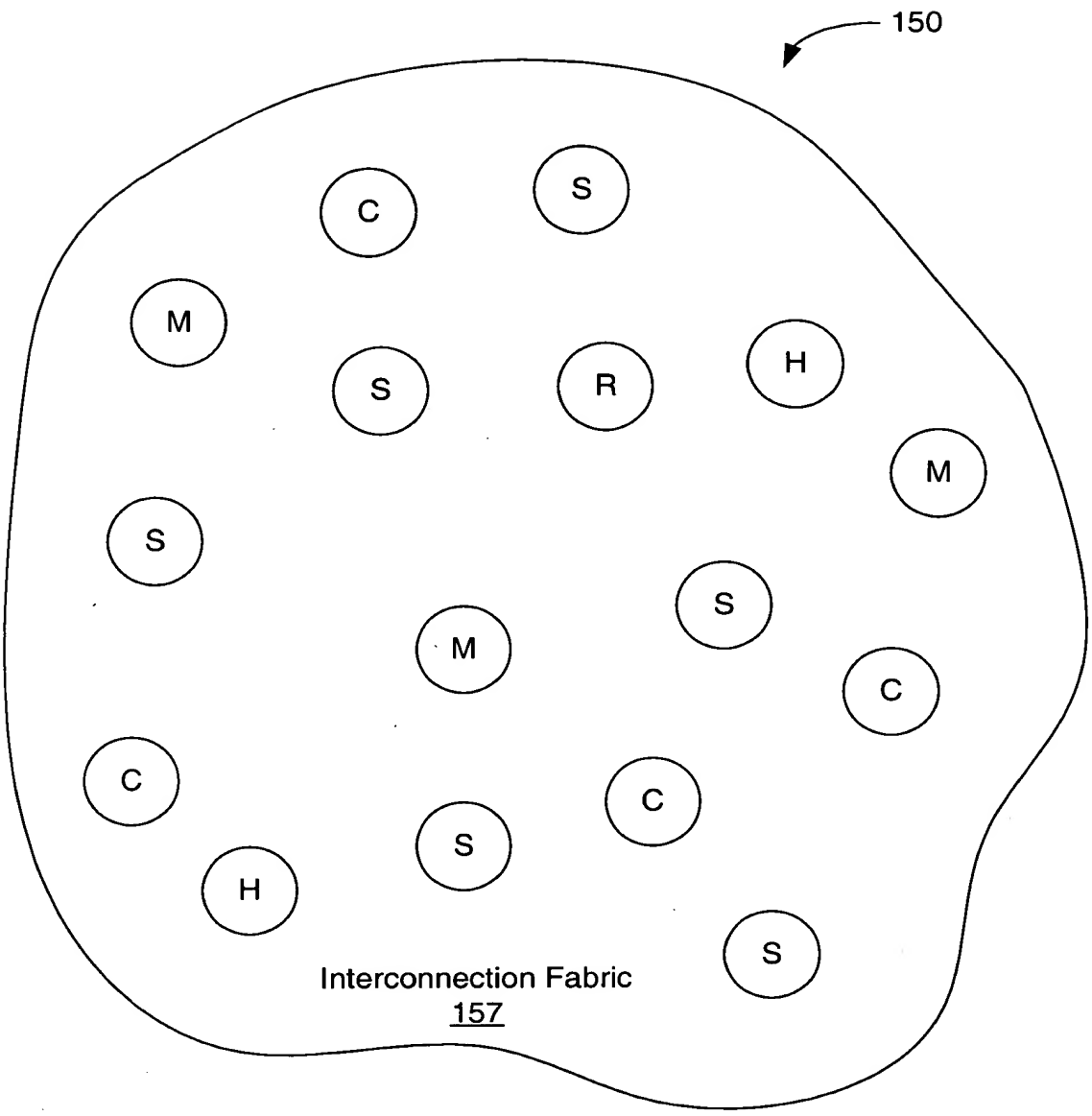

100
Storage System 150
Storage Array Controller 155
157
Array of Storage Devices 160
I/O Bus 110
Processor(s) 101
Bus Bridge Unit 105
System Memory 110

Fig. 2A



H - Host Interface or Line Card
S - Mass Storage (e.g. Disk Drive)
M - Memory (e.g. Storage Cache)
C - Controller, (e.g. RAID Controller)
R - Router Node

Fig. 2B

09880166 - 060400

T02T90" 99T08860

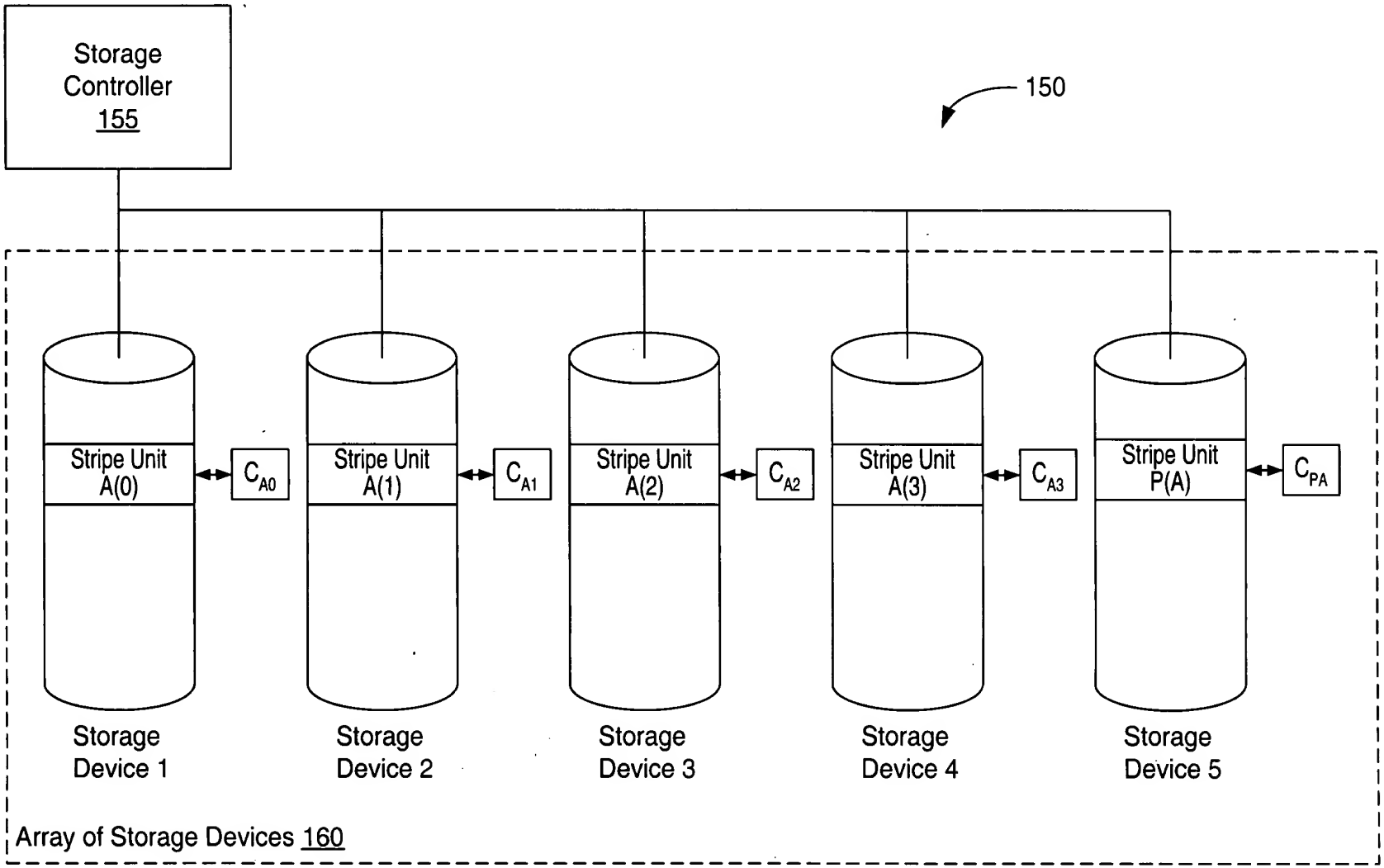


Fig. 3

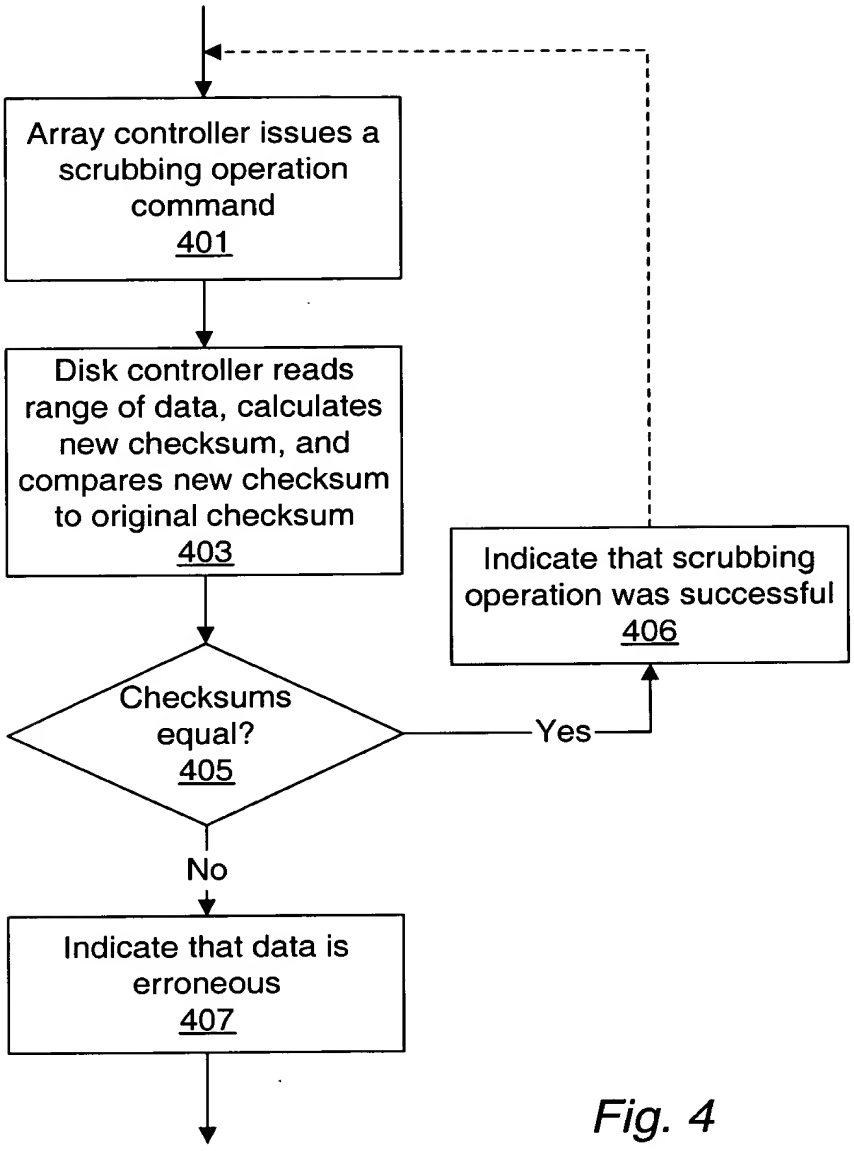


Fig. 4

Docket No. 200207-1

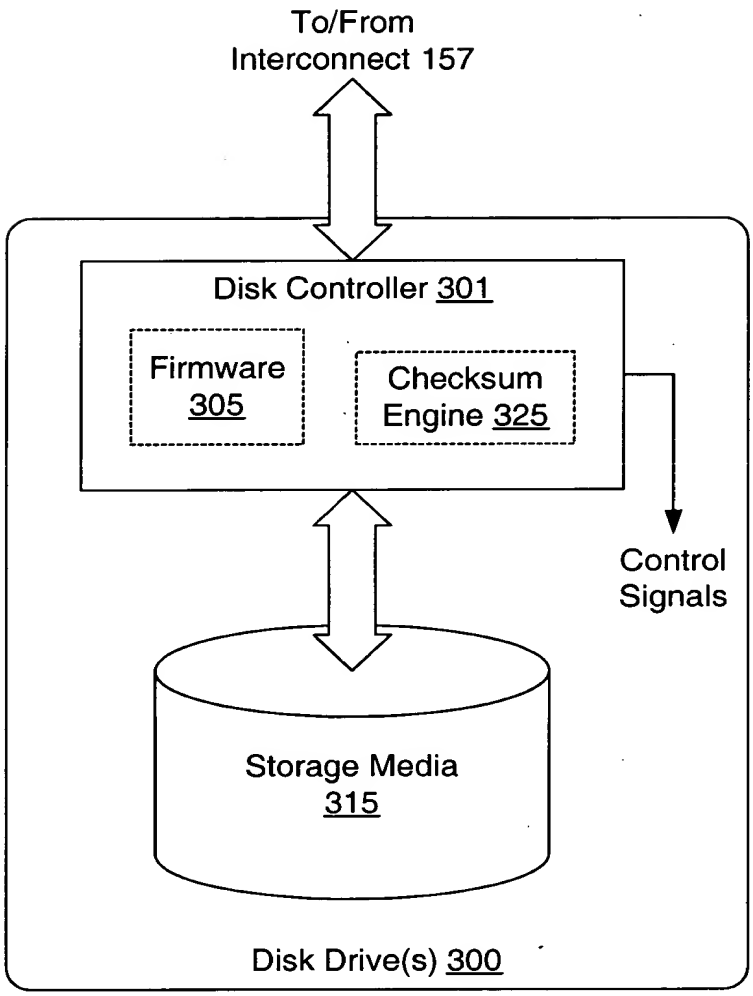


Fig. 5A

09809456 - 050201

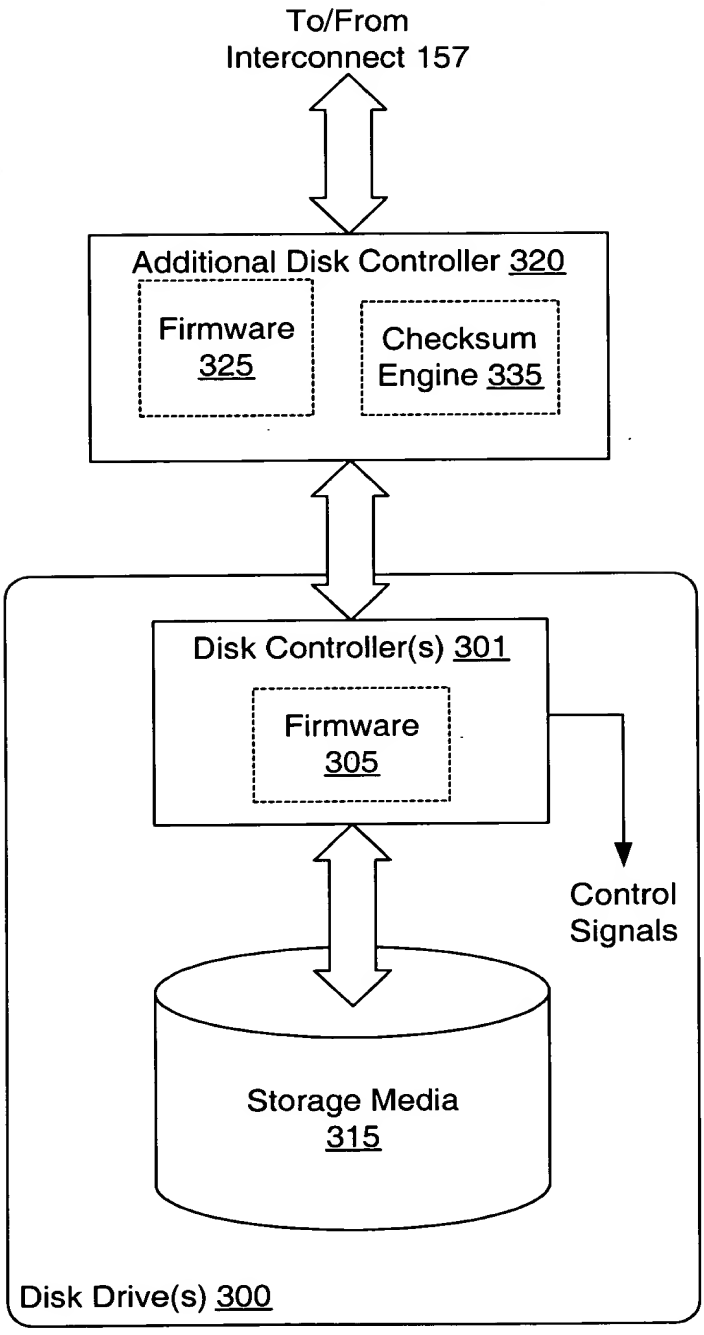

To/From
Interconnect 157
Additional Disk Controller 320
Firmware
325
Checksum
Engine 335
Disk Controller(s) 301
Firmware
305
Control
Signals
Storage Media
315
Disk Drive(s) 300

Fig. 5B

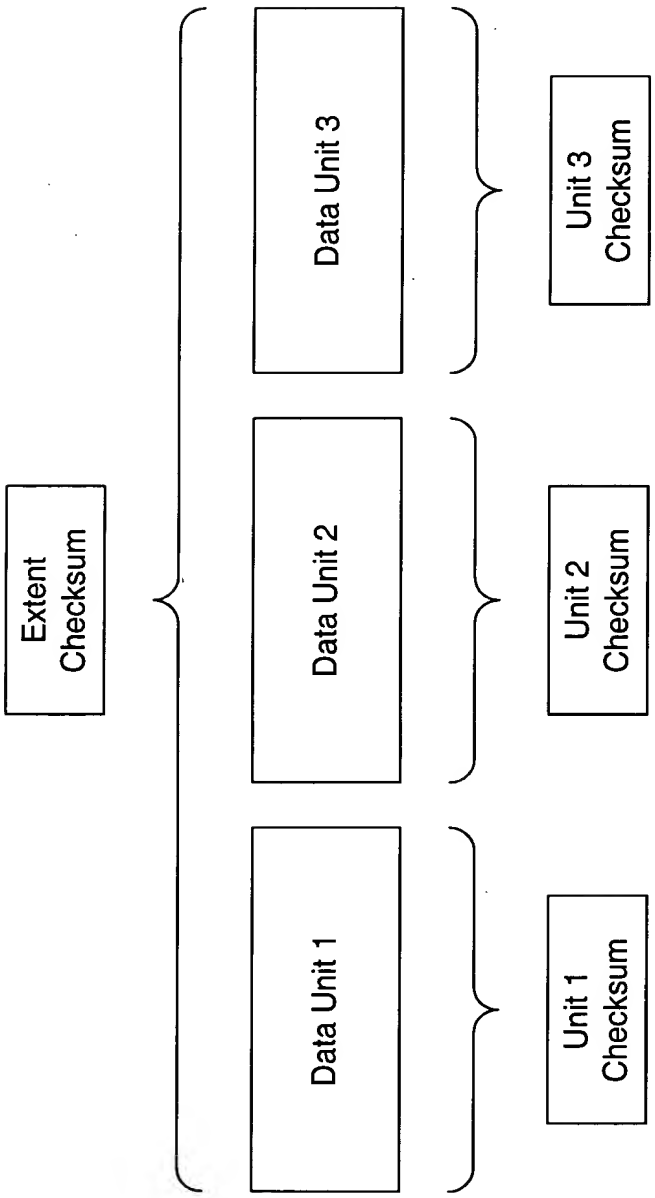

Extent Checksum
Data Unit 1
Data Unit 2
Data Unit 3
Unit 1 Checksum
Unit 2 Checksum
Unit 3 Checksum

Fig. 6

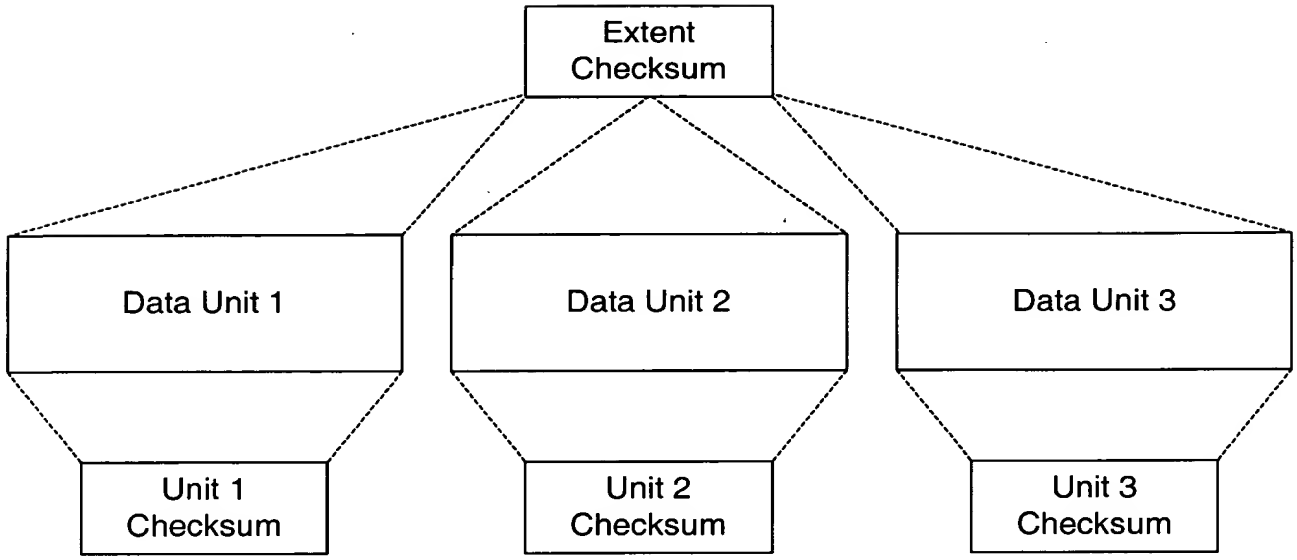


Fig. 7A

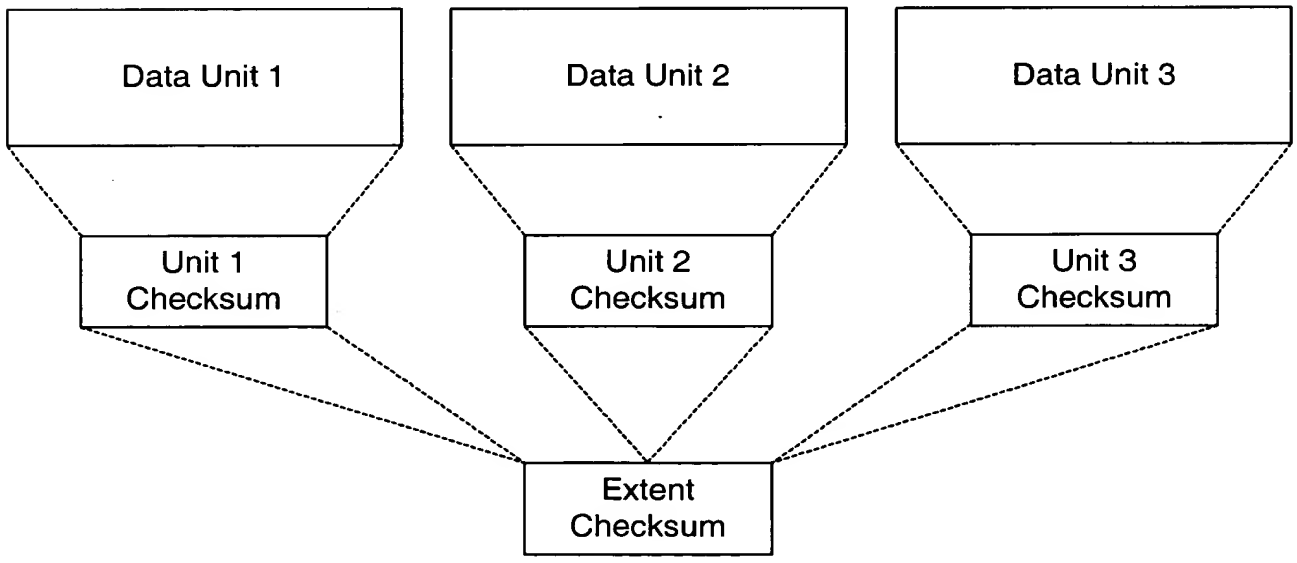


Fig. 7B

09690156 - 061204

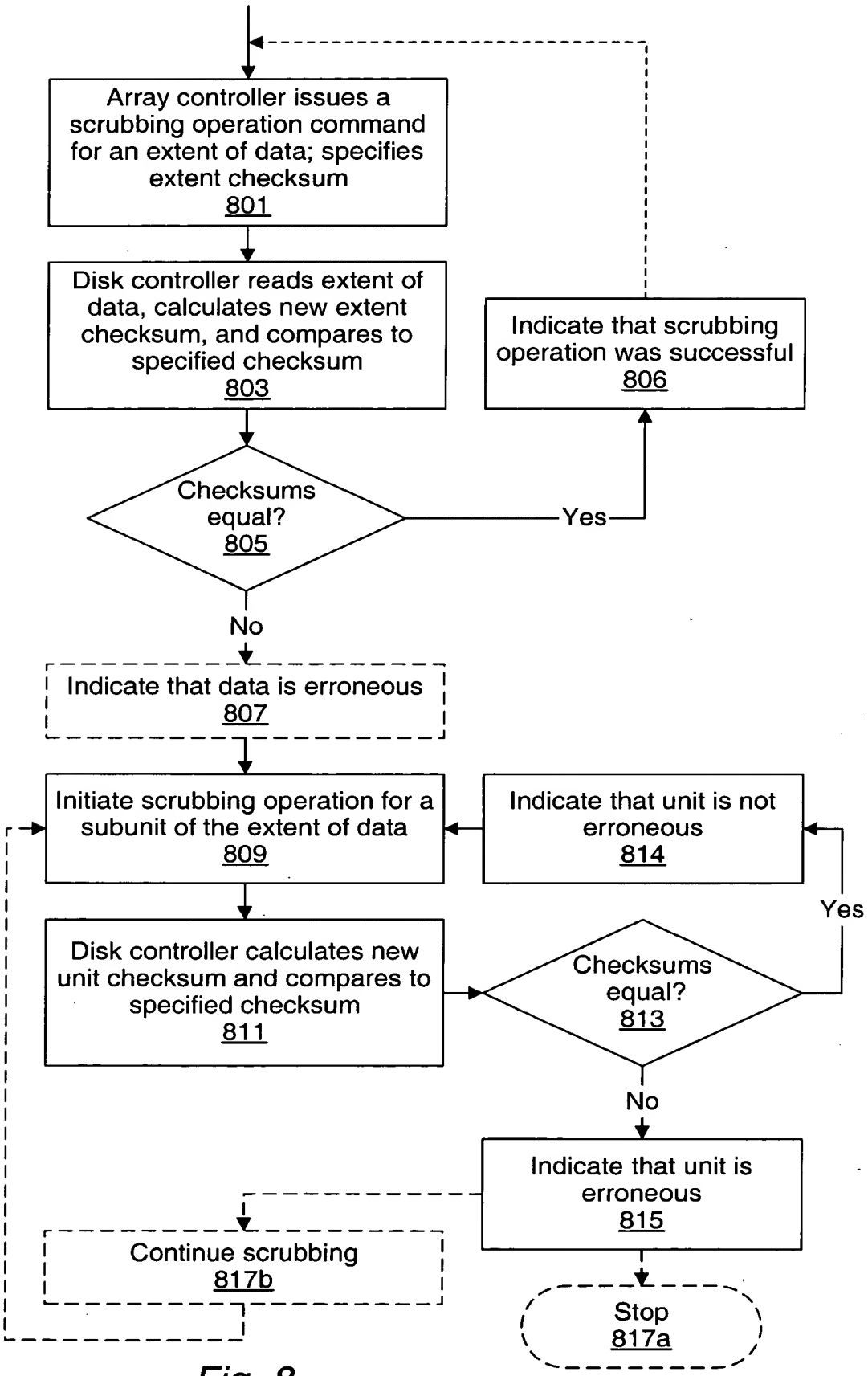

Array controller issues a scrubbing operation command for an extent of data; specifies extent checksum
801
Disk controller reads extent of data, calculates new extent checksum, and compares to specified checksum
803
Checksums equal?
805
Yes
Indicate that scrubbing operation was successful
806
No
Indicate that data is erroneous
807
Initiate scrubbing operation for a subunit of the extent of data
809
Disk controller calculates new unit checksum and compares to specified checksum
811
Checksums equal?
813
Yes
Indicate that unit is not erroneous
814
No
Indicate that unit is erroneous
815
Continue scrubbing
817b
Stop
817a

Fig. 8

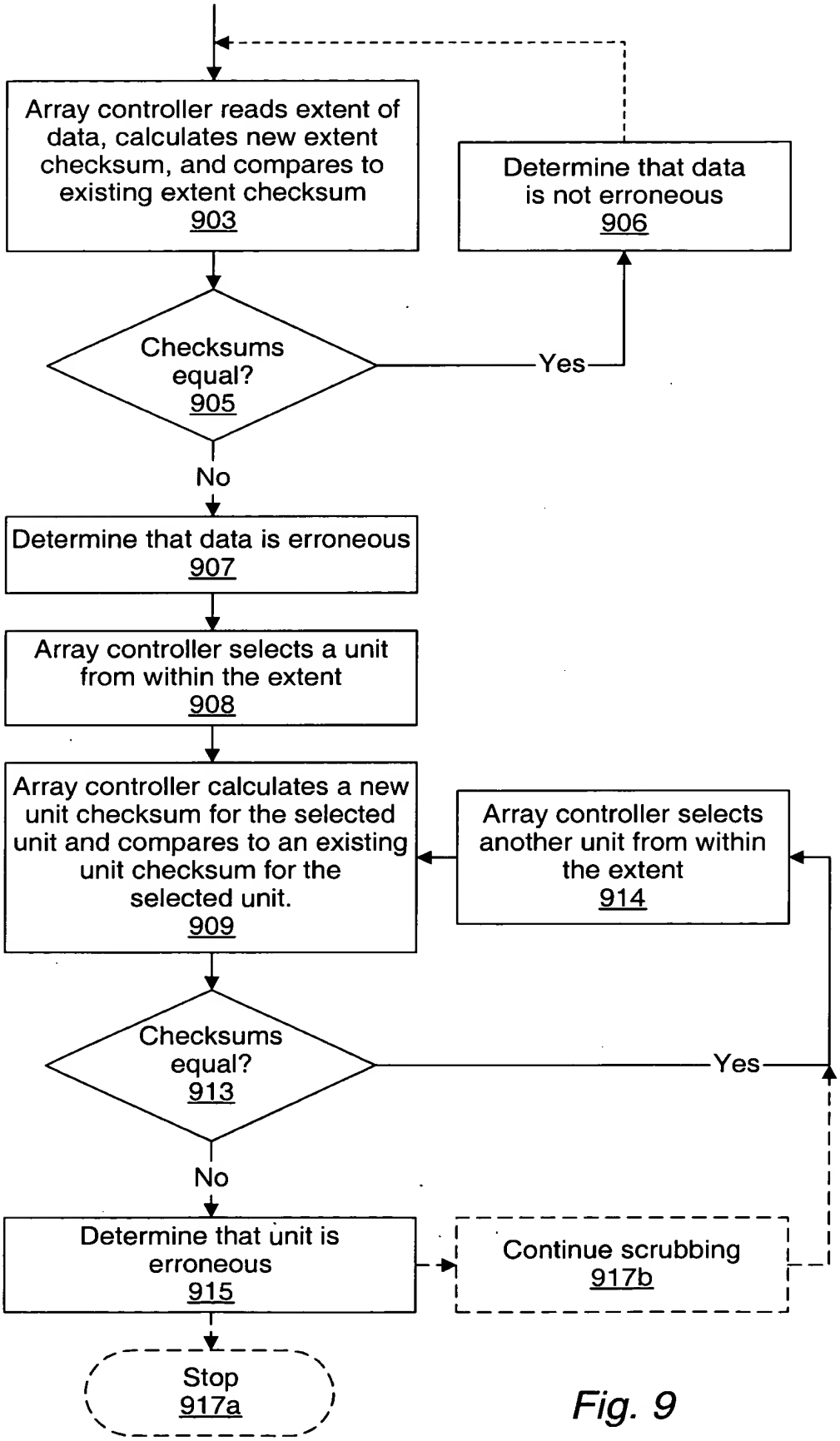

Array controller reads extent of data, calculates new extent checksum, and compares to existing extent checksum
903
Checksums equal?
905
Yes
Determine that data is not erroneous
906
No
Determine that data is erroneous
907
Array controller selects a unit from within the extent
908
Array controller calculates a new unit checksum for the selected unit and compares to an existing unit checksum for the selected unit.
909
Array controller selects another unit from within the extent
914
Checksums equal?
913
Yes
No
Determine that unit is erroneous
915
Continue scrubbing
917b
Stop
917a

Fig. 9